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[54] **SYSTEM AND METHOD FOR CAVITY GENERATION FOR SURGICAL PLANNING AND INITIAL PLACEMENT OF A BONE PROSTHESIS**

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[58] **Field of Search** ..... 606/79, 80, 86, 606/89; 623/16, 22, 23, 66; 128/898, 920, 922, 923; 364/413.13; 395/80, 924

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[57] **ABSTRACT**

Methods, systems and apparatus for planning the position of a prosthesis in a long bone in orthopaedic surgical procedures, such as hip replacement surgery, knee replacement surgery, long bone osteotomies, and the like. A bone model is generated from a scanned image of a bone, a prosthesis model is selected from a library of prosthesis models and then a cavity model is formed based on the prosthesis model and/or the bone model. The cavity model may then be positioned over the bone model, either interactively by the surgeon or automatically through an algorithm based on clinical parameters, to determine a reasonable location for implantation of a prosthesis within the bone. The cavity model allows the surgeon to optimize placement of the implant within the bone, and it provides important clinical information to the surgeon, such as areas in which press fits are provided, extension areas for possible subsidence and access areas for allowing the surgeon to insert the implant into the cavity.

**30 Claims, 13 Drawing Sheets**

